

a first signal dependent on the ambient influences

characterized in that the first signal,

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- passes through the filter directly and

- drives an internal actuator or a internal control elements (3a, 3b) of the apparatus

which has an effect on the imaging or on the image display, in a calibrated state of the apparatus, which

comprises

- a setting of a transfer characteristic of the filter, image degradations are greatly reduced or essentially compensated for,

and in that

the filter (5), for calibrating the apparatus, has

- a calibration input and

- a second signal is applied to the calibration input of the filter.

2. (Amended) Apparatus according to claim 1, characterized in that

the at least one sensor (4) is adapted for detecting at least one physical quantity outside the apparatus, and for outputting the first signal which depends on the ambient influences at the location of the sensor.

3. (Amended) Apparatus according to claim 2, characterized in that the sensor (5) comprises at least one pick-up for electromagnetic or magnetic fields or air vibrations or ground vibrations.

4. (Amended) Apparatus according to claim 1, characterized in that the filter (4) comprises a signal input which is connected to an output of an image processing device (2) which is

connected upstream with an image acquisition device (7) for acquiring at least one pixel of an object, and also an image display device.

5. (Amended twice) Apparatus according to claim 1, characterized in that the apparatus comprises a device for manually calibrating the filter.
6. (Amended twice) Apparatus according to claim 1, characterized in that the control element (3) is arranged in the image processing device (2).
7. Apparatus according to claim 1, characterized in that the actuator (3) is assigned to the scanning device.
8. (Amended twice) Apparatus according to claim 4, characterized in that an output of the image processing device (2) is connected to the calibration input of the filter (5).
9. (Amended twice) Apparatus according to claim 1, characterized in that the second signal varies as a function of scanning position of a scanning device of the apparatus (1) or of time.
10. (Amended twice) Apparatus according to claim 2, characterized in that the apparatus is for operation in a calibration mode and subsequently operable in an image mode, whereby, in the calibration mode, ambient influences which degrade the image are detected by the comparison of an image of a predetermined reference object with an image of the real structure in the image processing device (2), and are greatly reduced or essentially compensated for by calibration of the filter, and whereby image defects are compensated for by maintaining the calibration in the image mode, even in the event of a change in the ambient influences.
11. (Amended) Apparatus according to claim 10, characterized in that in the calibration mode:

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- a scanning device scans a selected section of a reference object,
- the image processing device (2) compares a stored signal assigned to the reference object with a real image signal of the reference object, the real image signal having been obtained from the image acquisition device (7), and whereby in the image processing device a defect signal is formed which is assigned to a difference resulting from the comparison between the stored and the real signal and which the image processing device outputs to the filter (5), and
- the apparatus stores, in a memory, data for generating the second signal for setting the transfer parameters of the filter for the image mode.

12. (Amended) Apparatus according to claim 10, characterized in that in the image mode:

- a scanning device scans an object to be imaged, and
- the apparatus, taking the data stored during the calibration mode as a basis, generates the second signal for defining the transfer parameters of the filter.

13. (Amended twice) Apparatus according to claim 2, characterized in that the apparatus is set up for automatically calibrating the filter during an image mode.

14. Apparatus according to claim 13, characterized in that the image acquisition device (7) scans the object to be imaged and the image processing device (2) is set up for determining the displacement of the line centroids of successive image lines within the whole image and outputs the second signal as a function of this temporal displacement to the filter (5).

15. (Amended) Apparatus according to claim 13, characterized in that the image processing device (2) is set up for determining a temporal displacement of the image

centroid of successive images and outputs the second signal as a function of this temporal displacement to the filter (2).

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16. (Amended twice) Apparatus according to claim 13, characterized in that the filter is set up for carrying out a cross-correlation of the first signal and of the second signal.
 17. Apparatus according to claim 1, characterized in that the apparatus is set up for reducing or compensating for the image degradation in two mutually orthogonal directions.
 18. Apparatus according to claim 1, characterized in that the apparatus comprises a scanning electron microscope, a force microscope, a surface roughness measuring instrument, an optical scanning microscope, a light microscope, a transmission electron microscope or a lithography installation.
 19. (Amended) Apparatus according to claim 18, characterized in that, in the case of the electron microscope, an actuator (3) comprises a device for deflecting a electron beam and/or a device for displacing the sample.
 20. (Amended) Apparatus according to claim 18, characterized in that, in the case of the light microscope, the actuator (3) comprises a device for deflecting light and/or a device for displacing a sample.
 21. (Amended twice) Apparatus according to claim 15, characterized in that the apparatus is a light microscope or a transmission electron microscope, wherein the first signal, as the second signal, is also determined on the basis of the temporal displacement that is determined.
 22. (Amended twice) Method for operating an imaging or raster-mode scanning apparatus for compensating for ambient influences that may degrade the imaging, comprising the steps of

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- providing a first signal dependent on the ambient influences
 - passing the first signal directly through an electrical filter (5),
 - providing an output signal of the filter
 - driving an internal actuator or an internal control element (3a, 3b) of the apparatus with the output signal, which has an effect on the imaging and/or the image display, whereby, in the calibrated state of the apparatus, which is effected by setting the transfer characteristic of the filter, the image degradation is greatly reduced or essentially compensated for, and the calibration of the apparatus is carried out by a setting of a filter (5) by a second signal being applied to a calibration input of the filter.
23. Method according to claim 22, characterized in that the calibration of the apparatus is carried out by manual setting of the filter (5).
24. Method according to claim 22, characterized in that a control element (3) in the image processing device (2) is driven and the compensation of the image degradation is carried out at least partially in the image processing device.
25. Method according to claim 22, characterized in that an actuator (3) in the scanning apparatus is driven and the compensation of the image degradation is carried out at least partially by driving the actuator (3) of the scanning apparatus.
26. (Amended) Method according to claim 22, characterized in that the apparatus is operated in a calibration mode and subsequently in an image mode, whereby
- ambient influences that degrade the imaging are detected by means of a sensor (4) which is arranged outside the apparatus and drives a signal input of the filter (5),
 - in the calibration mode, the degradation of the image is greatly reduced or essentially compensated for by an imaging of a predetermined reference object and comparison of

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the image of the reference object with a real structure of the reference object and by calibration of the transfer characteristic of the filter, and

- in the image mode, the degradation of the image is at least partially compensated for by maintaining the calibration, even in the event of a change in the ambient influences.

27. (Amended) Method according to claim 26, characterized in that the calibration mode comprises at least the following steps:

- determination of the first signal which depends on an interfering influence at the location of the sensor, by the sensor (4) arranged outside the apparatus;
- application of the first signal to the signal input of the filter;
- acquisition of a selected section (9) of the predetermined reference object by means of an image acquisition device (7) by the scanning of the reference object;
- comparison of the acquired selected section (9) with the real structure of the reference object; and
- determination of a defect signal assigned to a difference which results from the comparison;
- application of the second signal, derived from the defect signal, to the regulating input of the filter (5) for defining the characteristic of the filter;
- application of the output signal of the filter to the signal input of the regulating amplifier (6)
- application of the output signal of the regulating amplifier to an actuator or a control element (3) for the purpose of correcting the degraded image quality;

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- iterative calibration of the characteristic of the filter, in such a way that the reduction of the imaging quality is greatly reduced or essentially compensated for, by means of the following steps:

- comparison of the corrected image with the real structure of the reference object
- alteration of the characteristic of the filter in such a way that the corrected image approximates to the real structure of the reference object
- storage of data determined by the iterative calibration for providing the transfer characteristic of the filter for the image mode.

28. (Amended) Method according to claim 26, characterized in that, in the image mode, a sample is acquired by scanning, the characteristic of the filter of the apparatus that has been determined in the calibration mode being fixedly prescribed, and the output signal of the filter (5) which is a digital filter, after passing through a regulating amplifier (6), is assigned to the actuator or the control element (3), with the result that image defects are greatly reduced or essentially compensated for even in the event of a change in the ambient influences.

29. (Amended) Method according to claim 22, characterized in that

- ambient influences which impair the imaging are detected by means of the sensor (3), which is arranged outside the apparatus and drives the signal input of the filter (5) which is a digital filter, with the first signal,
- an image acquisition device (7) feeds an image processing device (2), in which an image analysis is carried out and a signal dependent on the analysis is applied as the second signal to the calibration input of the filter (5),

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- the output of the filter (5) is applied via a regulating amplifier (6) to the actuator or the control element (3) of the apparatus, which has an effect on the image, the image degradation thereby being greatly reduced or essentially compensated for.

30. (Amended) Method according to claim 31, characterized in that

- an object to be imaged is scanned by the image acquisition device (7),
- the image analysis comprises a recursive determination of a displacement of line centroids of successive image lines within the whole image, and
- the second signal is calculated from the temporal displacement, which is a temporal displacement.

31. (Amended) Method according to claim 29, characterized in that

- the image analysis comprises a recursive determination of a displacement of image centroid of successive images, and
- the second signal is calculated from the temporal displacement, which is a temporal displacement.

32. (Amended twice) Method according to claim 30, characterized in that essentially a cross-correlation of the first signal with the second signal is carried out in the filter (5) and, consequently, the actuator or the control element (3) is fed with a drive signal which is dependent on the cross-correlation between the first signal and second signal.

33. (Amended twice) Method according to claims 22, characterized in that

- feeding an image processing device (2) with an image signal of an image acquisition device (7),
- analyzing of the image signal in the image processing device (2), and

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- applying a signal dependent on the result of the analyzing step as the first signal to a signal input of the filter, and
 - applying a signal dependent on the result of the analyzing step as the second signal to a signal input of the filter, and
 - applying the output of the filter (5) via a regulating amplifier (6) to the actuator or the control element (3) of the apparatus, which has an effect on the imaging, the imaging degradation thereby being greatly reduced or essentially compensated for.

34. (Amended) Method according to claim 33, characterized in that the analyzing of the image comprises a recursive determining of a displacement of line centroids of successive image lines within the whole image or the recursive determination of the displacement of the image centroid of successive images.

35. (Amended twice) Method according to claim 22, characterized in that the image degradation is essentially compensated for by means of the actuators or the control elements (3) acting in two mutually orthogonal directions.

36. (Amended) Apparatus for compensating for ambient influences in imaging and/or raster-mode scanning apparatuses that may degrade the imaging, comprising:

- a calibratable digital electrical filter (5);
- a regulating amplifier (6) which is electrically connected downstream of the filter, characterized in that
- an internal actuator or an internal control element (3a, 3b) of the apparatus is driven by the regulating amplifier, and that

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a first signal dependent on the ambient influences can be passed via a signal input of a filter (5) through the latter, and a second signal is applied to a calibration input of the filter, and

the internally driven actuator or the driven control element (3a, 3b) has an effect on an image, whereby, in a calibrated state of the filter, the image degradation is greatly reduced or essentially compensated for.

37. Apparatus according to claim 36, characterized in that the apparatus comprises at least one sensor (4) for detecting at least one physical quantity outside the apparatus, this sensor outputting the first signal which is dependent on the ambient influences at the location of the sensor.

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38. Apparatus according to claim 8, characterized in that the apparatus is designed for operation in a calibration mode and for subsequent operation in an image mode, whereby, in the calibration mode, ambient influences which degrade the image are detected by the imaging of a predetermined reference object and comparison of the image with the real structure of the reference object in the image processing device, and are greatly reduced or essentially compensated for by calibration of the filter, and whereby the image defects are compensated for by maintaining the calibration in the image mode, even in the event of a change in the ambient influences.

39. Apparatus according to claim 8, characterized in that the apparatus is set up for automatically calibrating the filter during the image mode.
40. Apparatus according to claim 8, characterized in that the apparatus is a light microscope or a transmission electron microscope, the first signal also being determined from the temporal displacement that is determined.

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41. Apparatus according to claim 15, characterized in that the apparatus is a light microscope or a transmission electron microscope, the first signal also being determined from the temporal displacement that is determined.

Please add the following new claim 42:

42. Apparatus according to claim 4, characterized in that the apparatus is for operation in a calibration mode and subsequently operable in an image mode, whereby, in the calibration mode, ambient influences which degrade the image are detected by the comparison of an image of a predetermined reference object with an image of the real structure in the image processing device (2), and are greatly reduced or essentially compensated for by calibration of the filter, and whereby image defects are compensated for by maintaining the calibration in the image mode, even in the event of a change in the ambient influences.

In the Abstract of the Disclosure:

Attached hereto is an Abstract of the Disclosure for use with the above-identified application.